

CSIR NEWS

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SERC's Low-Cost Model House Wins Prize

The low-cost funicular-shell model house designed and constructed by the Structural Engineering Research Centre (SERC), Madras, won the first prize at the Low-cost Demonstration Housing Exhibition held in Madras in January 1977. The exhibition was organized in connection with the International Seminar on Low-cost Housing. Prof. Y. Nayudamma, Secretary to the Government of India and Director General, Scientific & Industrial Research, gave away the certificates and shields to the prize-winning entries.

In the exhibition, SERC demonstrated two low-cost model houses—one using the precast two-way spanning flooring (roofing) scheme, and the other a funicular shell house using 'latoblocks' developed by the laboratory. The houses incorporated a number of innovative features in an effort to prune the consumption of material and the construction time to a minimum and also to achieve significant reduction in the overall cost of construction.

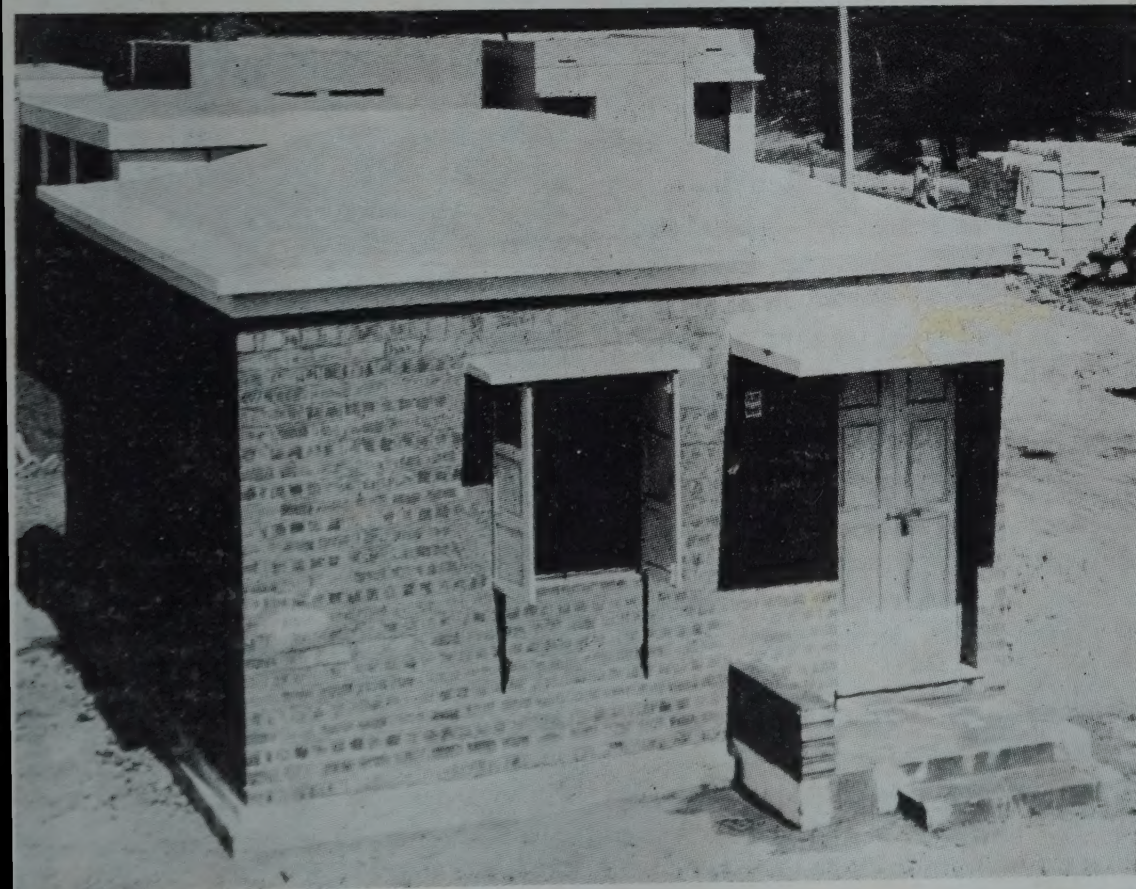
The flooring (roofing) scheme that has been developed by SERC incorporates a new technique which enables a two-way spanning floor (roof) to be built with precast units which are light

in weight and require no sophisticated handling or erection equipment. Moreover, no centring is needed for the construction.

The prize-winning model demonstrated that single-storeyed house, ideally suited for the economically weaker sections of the society, could be built at low cost by roofing them with funicular masonry shells supported on walls. Earlier, SERC had developed a method for production of strong and durable building blocks from lateritic soil. The new building block, known as 'Latoblock' is comparable to good-quality bricks in strength and durability. The structural scheme of the funicular house comprises a number of new features such as the use of the new and economical construction material latoblock, construction of a funicular shell roof, and the use of a mobile, repeatable and economical steel formwork suitable for row housing. As the funicular shell ensures uniform vertical loading to keep the entire shell in pure compression without any tensile and shearing stress, no reinforcement is necessary in the shell.

SERC has brought out a brochure giving details of the two model houses demonstrated in the exhibition.

The entries were assessed by an international jury with Prof. Oktay Ural, President of the International Association for Housing Science, as chairman. The SERC entry won the prize on the basis of its general, structural and architectural concepts, appropriateness of the technologies used and the possibilities of economy in the use of cement and steel.



Funicular shell house designed and constructed by SERC

FICCI Award for ATIRA

The Ahmedabad Textile Industry's Research Association (ATIRA), Ahmedabad, has been chosen for the Federation of Indian Chambers of Commerce and Industry (FICCI) award for 1976 in the field of science and technology. The award is for extensive scientific researches and technological development that ATIRA has carried out over the last two decades for 'reduction in energy consumption and utilization of waste energy in the Indian cotton textile industry'.

The importance of fuel and energy conservation in industrial processes, especially in view of the high cost of fuels, cannot be over-emphasized. In a composite textile mill, the fuel and electrical costs account for 8% of the total cost of production of cloth. Considering that there are 700 textile mills in the country the energy expended in running the textile mills is enormous. Any reduction in fuel and power costs in textile processes would therefore reduce the cost of production of cloth, increase the profitability of the mill, and reduce imports of oil.

In the field of fuel economy and power consumption, ATIRA has carried out studies on the following lines: (i) choice of fuel, viz. coal, furnace oil and natural gas for boilers for raising steam; (ii) improvement in the performance of boilers in textile mills; (iii) reduction of waste in distribution and utilization of steam in textile processing machines; (iv) improvement in drying systems; (v) recovery of waste heat from textile processing machines; (vi) development of low-temperature catalysts for pigment printing and resin finishing with a view to reducing consumption of electrical energy and increasing production.

The results of the above studies have been implemented in a large number of textile mills, as a consequence of which considerable savings in fuel costs have been effected. In addition to these direct benefits,

ATIRA's work has generated consciousness about fuel and power economy in the managerial and technical staff of textile mills.

In order to communicate effectively the results of its findings on fuel economy and power conservation, ATIRA has published several research reports, technical leaflets and a comprehensive monograph on the subject. For better impact on technicians and operatives, a film entitled 'Fuel economy in textile mills' has also been produced.

SASMIRA's Synthetic Fibres Demonstration Plant

A demonstration plant for the development, production and use of synthetic fibres, viz. nylon and polyester, both staple and filament, is being set up at the Silk & Art Silk Mills' Research Association (SASMIRA), Bombay, with the assistance of the United Nations Development Programme (UNDP) and the Government of the Federal Republic of Germany. The contribution of UNDP towards this project is \$ 1.06 million, while that of the Federal Republic of Germany is DM 5 million. The entire project aid amounts to over Rs 25 million and the Indian contribution to this project is envisaged at Rs 10 million.

The project has twin objectives – short-term and long-term. The short-term objectives are to provide: (i) facilities for the training and upgrading skills of personnel in synthetic fibre technology; (ii) facilities for experimental work, especially in the polymer-to-yarn processes, for synthetic fibres and for the development and application of process and product technology in this field; and (iii) a focus for the collection and dissemination of technical data on synthetic fibres.

The long-range objectives are : (i) to exchange and accelerate the production and use of synthetic fibres as textile fibres in order to reduce India's dependence on imported cotton and other raw materials for the textile

industry; and (ii) to establish technical and advisory services in synthetic fibres for the textile industry, including the undertaking of systematic programmes of experimental work and training, collection and dissemination of technical information, provision of non-partisan consultancy services, and provision of impartial communication links between fibre producers, textile mills, textile trade and consumers to ensure that all efforts in this field are effectively coordinated.

The demonstration plant will consist of a dual-purpose polymerization line with a rated capacity of about 500 kg/day each of polyester or polyamide chips. It will also consist of the following: (i) a versatile melt spinning section capable of producing textile monofilaments from 10 to 30 den., multifilaments from 20/8 to 150/24 den., industrial yarns from 240/40 to 1260/415 den., and a staple fibre tow having a total of 3600 den. The equipment would allow operation at conventional speeds as well as high speed spinning; (ii) a draw twisting section, with capacity matching with the melt spinning plant and having one draw twister for textile yarns and another for industrial yarns; and (iii) a staple fibre processing unit with two drawing stages, washing and spin finish application equipment, crimper, thermosetting unit, cutter, and baler, with a drawing capacity of 50,000 den.

The foundation-stone of the plant was laid by Shri K. D. Malaviya, Union Minister for Petroleum, Chemicals and Fertilizers, on 20 January 1977.

Airborne Transducers and Associated Instrumentation : NAL's New Project

A new project entitled 'Development of airborne transducers and associated instrumentation' has recently been initiated at the National Aeronautical Laboratory (NAL), Bangalore.

The success of an airplane in accomplishing its operational mission depends upon the accuracy with which certain aerodynamic parameters of the

air mass through which the airplane is flying can be measured. Therefore, it is important that these measurements are done as accurately as possible. In order to achieve this, it is proposed under this project to develop airborne transducers and associated instrumentation for the measurement of static pressure, dynamic pressure, outside air temperature and angle of attack. Complete indigenous know-how for the eventual production of the system suitable for any aircraft will be developed.

The project will cost Rs 6.95 lakh and is expected to be funded by the Aeronautics Research and Development Board for a period of four years.

NAL Develops Non-contact Type Linear Displacement Meter

A non-contact capacitance-type displacement transducer for precise measurement of linear displacements and amplitudes of a vibrating structure or body has been developed by the National Aeronautical Laboratory, Bangalore. The basic device comprises two parallel plates, one as a part of the transducer and the other constituted by the object whose displacements are to be measured, the separation between them being taken as a mea-

sure of the amplitude. The transducer and the associated measuring instrument can be employed for measuring static and dynamic displacements. With slight modifications, roundness and eccentricities of shafts, strip thickness, and thickness of paint, paper or other non-conductive sheets can also be measured quantitatively. The transducer is rugged, has no moving parts, and can operate with connecting cable lengths of up to 5 m. The transducer performance is unaffected by magnetic fields and high temperature surroundings up to 120°C.

The specifications of the displacement meter are:

Range	: 1, 2 or 3 mm full scale, with separate transducers switchable in the main instrument
Non-linearity	: less than $\pm 0.5\%$ fsd
Resolution	: infinite for transducer
Accuracy	: $\pm 1\%$ fsd
Frequency response	: from 0 to 600 Hz, flat; at 1 kHz, -3dB
Sensitivity	: 2 V/mm (with transducer amplifier)
Ambient range for transducer alone	: + 10°C to +120°C
Ambient range for instrument alone	: + 10°C to +50°C
Nominal dimensions	: Transducer—25 mm \times 40 mm \times length Indicator—35cm \times 10cm \times 25 cm
Power requirements	: 230 V, 50 Hz, 10 VA

Presently the device is undergoing pilot plant trials.

NAL's 1-ft Trisonic Wind Tunnel Completes 10,000 Blowdowns

The 1-ft trisonic wind tunnel of the National Aeronautical Laboratory (NAL), Bangalore, completed its 10,000th blowdown recently. Since its first blowdown in 1966, this indigenously designed research facility has been in continuous operation. In recent years, the average number of blowdowns per year has increased to as high as 1800. The tunnel, first of this size in the country, is one of the major aerodynamic test facilities used for undertaking basic and applied

research in aerodynamics and fluid mechanics.

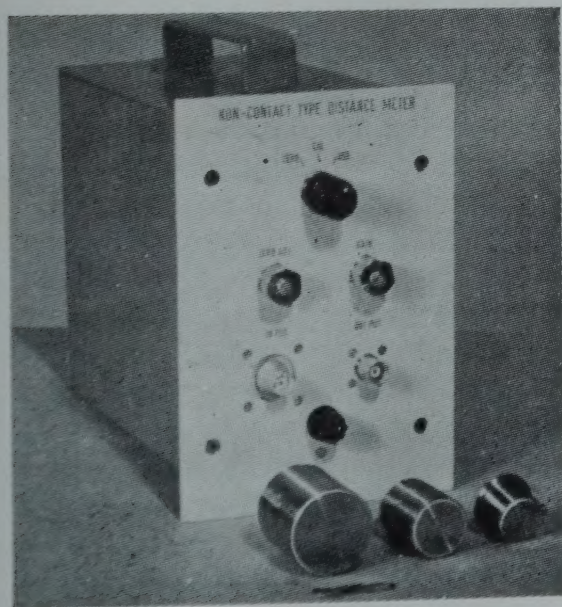
Being of intermittent blowdown type, the wind tunnel draws air from the storage tanks containing compressed air at 10 atm. The duration of a normal blowdown varies from 10 to 90s, and a still higher duration can be obtained whenever required, by making use of the additional storage tanks. The tunnel can generate flows in subsonic, transonic and supersonic regions covering a Mach number range of 0.4 to 3.5. Slotted wall test section for transonic Mach number and fixed convergent divergent nozzle blocks for supersonic Mach number are used. The tunnel is equipped with necessary control, optical and data acquisition systems for making sophisticated measurements for investigation of flows over models.

Some of the developmental investigations that have been carried out in the tunnel relate to supercritical airfoils, base flows, dynamic stability tests on oscillating models, and pressure and force measurements.

CFTRI's Non-toxic Food Protectant

Vitaminized tricalcium phosphate has been found to be a potent weapon which can reduce sharply the spoilage of milled and processed foodgrains by insects, without harmful effects on man or environment. Researches carried out at the Central Food Technological Research Institute (CFTRI), Mysore, have shown that milled grains and flours can be protected against insects by adding the prescribed amount of a mixture of tricalcium phosphate, glucose and vitamin. This composition increases the food value for man, but shortens the already brief life span of insects.

Recent large-scale trials abroad have established the efficacy of this non-toxic food protectant in preventing insect infestation in flour and enriched foods for several months. It is reported that the addition of tricalcium phosphate to large quantities of



Non-contact type displacement meter developed at NAL

CSM (a commercial preparation of maize-meal, soybean flour, dried milk, vitamins and minerals) that were being shipped from USA to South America suppressed the development of large populations of the principal insect pest, *Tribolium castaneum*, during storage in heavily infested warehouse in Colombia for six to seven months. Also, a similar treatment of flour suppressed the development of large populations of other insects like *Rhizopertha dominica* (F), *Lasioderma sericorne* (F), *Tenebroides mauritanicus* (L) and an unidentified moth. Owing to the additive effects of glucose and B-vitamins on the action of tricalcium phosphate on insects the effective dosage of this protectant can be brought down to 0.2-1% depending on the nature of the food product. Thus the Indian research is finding application not only in developing countries but also in advanced countries.

NEW PUBLICATIONS

Health Buildings : Research and Development

The Central Building Research Institute (CBRI), Roorkee, has carried out systematic and scientific investigations on health buildings with a view to achieving functional efficiency, speed and economy in the construction of these buildings. The results of these studies have been utilized in the construction programmes undertaken by the states of Uttar Pradesh and Karnataka. CBRI has recently brought out a brochure which describes the work done by the institute in this direction from the research stage to the application stage.

Copies of the brochure can be had from the Director, Central Building Research Institute, Roorkee.

'For Safety and Productivity in Mines'

The Central Mining Research Station (CMRS), Dhanbad, has brought out a brochure under the above title. The brochure describes the objectives, activities and accomplishments of CMRS.

It depicts the wide range of problems that CMRS is called upon to study and the extensive research, testing and analytical facilities that are available at the institute.

Copies of the brochure can be had from the Director, Central Mining Research Station, Dhanbad 826001.

CSIR Procedures regarding Transfer of Technology and Related Matters*

This compilation, also brought out by the Technology Utilization Division of CSIR, gives details regarding commercialization of CSIR processes and patents through NRDC, sponsored research done at the CSIR laboratories, CSIR patent procedure, etc. It also gives information about the procedural matters, terms, conditions, etc. relating to the technology transfer.

Training Facilities in CSIR Laboratories and Cooperative Research Associations*

A revised edition of this publication [CSIR News, 26 (1976), 71] has been brought out by the Technology Utilization Division of CSIR. The publication contains information regarding different training programmes indicating the names of the institutions where the training is available, duration, fee and the preferential eligibility for admission.

Incentives and Facilities for Research & Development in Industries*

Compiled by the Technology Utilization Division of the Council of Scientific & Industrial Research (CSIR) the booklet gives details of the incentives and facilities available for R&D and the procedural matters related thereto.

*Enquiries concerning these publications should be addressed to the Chief, Technology Utilization, Council of Scientific and Industrial Research, Rafi Marg, New Delhi 110001.

The procedure for obtaining recognition of R&D centres by the Department of Science and Technology is also given in the publication.

Rural Development Digests : CECRI

The Central Electrochemical Research Institute (CECRI), Karaikudi, has started bringing out a bulletin entitled 'Rural Development Digests'. The aim of the bulletin (mimeographed) is to disseminate information on the various facets of rural development in the form of an annotated bibliography. The first two numbers are already out. Further particulars regarding the bulletin can be had from the Director, Central Electrochemical Research Institute, Karaikudi 623006.

PROGRESS REPORTS

NGRI Annual Report : 1975-76

The annual report of the National Geophysical Research Institute (NGRI), Hyderabad, for the year 1975-76, brought out recently, shows that the institute continued R & D activities in the fields of geophysical exploration, geophysical instrumentation and various basic and applied aspects of solid earth geophysics. A new project for development of techniques for mineral exploration supported by UNDP was taken up during the year. Findings of the deep seismic sounding (DSS) project provided valuable information regarding the structure of the earth's crust in the regions of study.

Developmental geophysical exploration using IP and resistivity techniques were undertaken in Jonnagiri area of Pattikonda Taluk in Kurnool District of Andhra Pradesh. It has been established that the two-electrode array developed by NGRI is more advantageous and economical than other configurations.

The contribution by any ground element to the total dc resistivity signal recorded while profiling or logging has been calculated theoretically.

Studies have been made for detection of a thin intermediate layer of a stratified earth by electromagnetic sounding.

An atomic navigational system was procured and successfully flight-tested on a Dakota aircraft. This airborne position location unit, which is extremely useful in radio-navigation over sea, was obtained through assistance from F. R. G. The institute is now fully equipped to carry out multi-parameter, viz. magnetic, scintillometric and electromagnetic, airborne geophysical surveys both over land and sea.

A digital data acquisition and recording system³ was under development. This system will enable fast processing and interpretation of airborne geophysical data through high-speed computers. A final report on the airborne magnetic, and scintillometric surveys over South Bastar region in Madhya Pradesh was released giving specific recommendations for detailed ground follow-up.

Recommendations were finalized for a total of 26 well sites in the Lower Maner Basin covering part of Warangal and Karimnagar districts of Andhra Pradesh. Monthly monitoring of water level, pH, conductivity, etc. in a number of selected wells in the basin was continued. A well at Koyuru drilled by the Central Ground Water Board and recommended on the basis of geophysical and hydrogeological investigations has been proved to be an artesian well yielding about 400,00 gal. per hour.

The deep seismic sounding data along the 600 km profile across the Peninsular India from Kavali to Udupi has revealed fine crustal structure. The findings will be useful for understanding the tectonics of the region as well as for providing basic/useful information for geophysical exploration programme. Depth sections across the great Himalaya have been constructed based on an international DSS programme across Pamir-Himalayan region. Some steeply dipping reflectors have been encoun-

tered along Indus-suture line. A 200 km long DSS profile was laid from Guhagar to Jatha at the request of the Koyna Project Authority. A preliminary analysis of data indicates that the DSS method can be successfully employed to study not only larger depths (60 to 80 km) but also shallower structures like traps in the area.

Integrated geochemical and geological traverses were taken along 12 profiles in the Precambrians of South India. About 340 gravity stations and 800 magnetic stations were established to investigate the nature of contacts in the shield. More than 400 representative rock samples were collected for detailed laboratory analysis.

A geotraverse in Kumaon Himalaya has yielded valuable structural data. Basic rocks and other associated rock samples from Kumaon, Pithoragarh, Almora and Nainital districts have been collected for detailed geochemical analysis. Preliminary studies indicate the spillitic nature of basic rock having large alkali contents.

Theoretical investigations were carried out for studying the lateral inhomogeneities and undulating geometry of transition zone in upper mantle. Studies on the magnetohydrodynamic waves in a rotating infinite medium and frictional damping due to core-mantle interface have been in progress. These studies are expected to throw light on the behaviour of geomagnetic secular variations.

Positive temperature gradients have been found near Tatapani hot spring area of J & K State. Detailed chemical analysis of thermal waters in different parts of the country have been carried out.

Facilities for the study of thermal expansion of rocks up to a temperature of 800°C have been set up. Miniature ultrasonic transducers have been constructed for single crystal studies. A borehole deformation gauge has been developed for precise determination of abutment of stresses and pillar stresses in mines. It is electrically operated and is dust- and moisture-proof. A convergence meter for long

wall panels of coalmines has been designed, fabricated and successfully tested in Singareni coalmines. The equatorial geoelectrical observatory at Ettayapuram was commissioned.

The institute's financial inputs for the year amounted to Rs 95.678 lakh. Receipts on account of technical services aggregated up to Rs 6.97 lakh.

Twenty-four research papers were published and 13 technical reports prepared during the year.

CRI Annual Report: 1975-76

The annual report of the Cement Research Institute of India (CRI), New Delhi, for 1975-76, published recently, shows that the institute has so far successfully completed 147 projects, including 60 sponsored projects, relating to : raw materials—exploration, evaluation and utilization including industrial wastes and lower-grade materials; manufacturing processes and operations, project engineering and quality control; development of new products; utilization of cement including concrete and construction technologies, structural engineering and quality control; and cement and concrete standard references.

CRI's computation of cement-grade limestone requirement in the country for 1978-2000 AD showed a deficit of about 2000 million tonnes. CRI therefore carried out explorations for limestones in the cement-deficient northern and north-eastern regions. The characteristics of limestones belonging to different ages and their amenability for beneficiation were examined.

The suitability of the limestone and clay deposits in the Kallakudi-Muduvathur area of Tamil Nadu for cement manufacture by vertical shaft kiln (VSK) process was established by CRI on a batch scale. A survey of raw material and infrastructural facility was carried out in the north-eastern region of the country and deposits *prima facie* found suitable for VSK plants were located. The suitability of

fly ash from the Badarpur Thermal Power Station was investigated for making portland pozzolana cement and concrete mixes with particular reference to the influence of variation in the quality of fly ash on the end products.

The institute has undertaken evaluation of the various techniques for moisture reduction in wet process plants for achieving fuel economy. With the aim of developing a precalcinator appropriate to the Indian cement industry, CRI conducted comprehensive study of the design and operational parameters of various precalcinator systems.

After the apparent failure of the vertical shaft kiln at Muduvathur to yield good quality clinker, the institute, after detailed study, modified the equipment of the plant. The modifications contributed to the success of the kiln operation in the trial runs conducted till recently. Commercial runs are under way.

CRI has also undertaken a critical review of the needs of instrumentation in Indian cement industry.

PROCESSES AND PRODUCTS READY FOR COMMERCIAL UTILIZATION

Weston Standard Cells

For measuring the voltage/potential of a given system using the null method, standard cells are used in colleges and laboratories as voltage standards. Though the sizes may differ, the method of fabrication of these cells is essentially the same except for some minor variations adopted for the different types.

The Central Electrochemical Research Institute (CECRI), Karaikudi, has developed three types of Weston standard cells, viz. college type (10 cm diam. \times 10 cm height); miniature type ($20 \times 20 \times 70$ mm³); and invertible type (20 mm diam. \times 60 mm height). These cells have been tested at the National Physical Laboratory, New Delhi, and their performance was found satisfactory. The cells conform to IS specifica-

The institute developed an improved packaging for cement to reduce seepage of cement and ingress of moisture while retaining functional fitness for filling, handling and transportation operations. Alternative designs based on jute, paper, plastic, bitumen and chemical coating—some of them specially for export packing—were developed.

The institute continued to supply standard cement for use in calibration of fineness determining equipment. During the year under review, 194 vials of standard cement were supplied to 28 organizations.

Three training courses on Preventive maintenance in cement industry; Concrete structures in cement plants—design and construction; and Geological and raw material investigations and mining practices in cement plants were organized during the year. Two seminars were also arranged.

Besides its regular periodicals, CRI also brought out a number of R&D publications, and technical reports and papers.

tions. The institute has prepared about 300 cells of these types.

The cell consists of two electrodes—the cadmium and mercury/mercurous sulphate systems. The electrolyte is cadmium sulphate, saturated or unsaturated, and acidified or neutral. Specially prepared cadmium amalgam (8-12%) is poured into one limb of a 'H' cell. Mercury and a specially prepared mercurous sulphate are placed in the other limb. Specially purified cadmium sulphate crystals are added to both the limbs in the case of saturated type. The electrolyte is added to the desired level and the cell is sealed. In the case of invertible unsaturated type, an unsaturated solution of cadmium sulphate is utilized and the cell is made invertible by using a porous plug/septum. The miniature cell is one

of the smallest ever made and has some novel design aspects which make it compact and vibration-proof.

Miniature type and invertible type cells are robust in construction and are very sensitive compared to the makes available abroad.

The estimated demand for college type cells is about 3000 cells per annum. The estimated annual future demand is about 5000 cells for college type, about 3000 cells for miniature type and about 5000 cells for invertible type cells.

The main raw materials required are cadmium sulphate (AR), mercurous sulphate (AR), cadmium (99.999% purity), mercury (AR) and platinum wire. All the raw materials except for cadmium (99.999%), mercury (AR) and platinum wire are available indigenously.

Rectifier, heating mantle, air oven, standard cells, precision vernier, galvanometer, chemical balance, thermostats and vacuum pump are the main equipment required.

The suggested capacity for an economically viable unit is 2500 cells/annum.

The cost of production per cell for three types of cells, viz. college type, miniature type and invertible type, has been worked out to be Rs 110, Rs 35 and Rs 40 respectively.

Further particulars can be had from: The Managing Director, National Research Development Corporation of India, 61 Ring Road, Lajpat Nagar III, New Delhi 110024.

Vanadium Pentoxide from Alumina Industry Sludge

Vanadium is an important metal which finds extensive uses in the form of metal, oxides and alloys. Vanadium pentoxide is used as catalyst in the production of sulphuric acid in contact process. It is also used for the production of ferro-vanadium which finds extensive use in alloy steel production. Because of its unique physical and chemical properties and as a result of accelerated activity in the study of

neutron bombardment of pure metals, many attempts have been made to produce pure massive ductile vanadium. Vanadium pentoxide for use as catalyst must be of 99.5% purity and for ferro-vanadium production, 98-99% with maximum phosphorus content at 0.05%. Vanadium pentoxide produced by the process developed at the National Metallurgical Laboratory (NML), Jamshedpur, is suitable for making ferro-vanadium as well as for catalytic applications.

The vanadium sludge from alumina industry containing vanadium as sodium metavanadate is dissolved in water, filtered and filtrate acidified. Vanadium is further precipitated from the acidified solution, filtered, dried and calcined to vanadium pentoxide.

Almost the entire requirements of the country in respect of these materials are at present met by import. In 1974-75, import of ferro-vanadium was 544 tonnes and is estimated to rise to 1000 tonnes by 1980. The imported price of vanadium pentoxide and ferro-vanadium is in the neighbourhood of Rs 70,000 and Rs 1,30,000 per tonne respectively.

Vanadium pentoxide produced by the NML process has been compared with imported V_2O_5 of equivalent specification and found to be equally good. V_2O_5 has been found to conform to the refined grade.

All the raw materials required are available indigenously. The main raw material, vanadium sludge, is available from alumina industry.

The basic equipment required for the production of vanadium pentoxide include leaching tanks, precipitation tanks, settling tanks, filtering equipment, rotary kiln for calcination, drying equipment and other process control media and packing/despatch arrangements. All the equipment can be designed and fabricated indigenously.

NML is in a position to offer consultancy services for 54 tonnes/annum (or higher capacity) unit, using vanadium sludge containing 20% V_2O_5 , in the form of a detailed project report and

necessary follow-up project engineering services.

The plant for the production of V_2O_5 can be set up at any location, such as light or medium scale industrial estates, as the space, power and other utility requirements are quite modest. Raw material handling is also not complicated. Location of the unit near the raw material source would be preferable.

The basic equipment for a 54 tonnes/annum plant by using the

sludge of 20% V_2O_5 grade is expected to cost about Rs 3 lakh (exclusive of land, building and other costs of installations). The cost of production is expected to be around Rs 46,000 per tonne and return on investment is expected to be 80%. The capital is expected to be returned in about 14 months.

Further particulars can be had from: The Managing Director, National Research Development Corporation of India, 61 Ring Road, Lajpat Nagar III, New Delhi 110024.

CSIR SUPPORT TO RESEARCH

Completed Schemes

Synthesis of 9-Alkyl Purines as Potential Carcinolytic Agents

Many of the significant anticancer agents react by interference in some way with the biosynthesis of nucleic acids or of purine- and pyrimidine-containing co-factors. The target of an inhibitor could be any molecular species present in the cell ranging in size from simple molecules to macromolecules such as proteins, nucleic acids and polysaccharides. Forces like covalent bond, hydrogen bond, Van der Waals forces and dipole forces have been found to be operative in binding the inhibitors to target molecules. The hydrophobic bonds have been considered by various workers in relation to biochemical mechanism and have been found important in the formation of an enzyme-inhibitor complex.

A project was undertaken at the Chittaranjan National Cancer Research Centre, Calcutta, by Dr (Miss) Sadhana Banerjee, a CSIR senior research fellow, to prepare some 9-alkyl-6-substituted purines as potential anticancer agents, which might interfere at some stages in the biosynthetic pathway of nucleic acids by hydrophobic binding at some site remote from the purine site of action. Miss Banerjee worked under the guidance

of Dr S. K. Chakraborti of the Department of Chemotherapy of the Centre.

9-Alkyl analogues of 6-chloropurine of varying chain lengths, viz. undecyl, dodecyl, tetradecyl, hexadecyl and octadecyl were prepared. Corresponding adenine and hypoxanthine analogues and mercaptopurine, a potent antitumour agent, were also prepared. With this target, 21 alkyl purines were prepared. The starting material for the purine synthesis was either a pyrimidine or a purine depending upon the availability of alkylating reagent. Purines when alkylated directly gave mixtures of 7- and 9-substituted isomers which were separated by chromatography. Condensation of 5-amino, 4, 6-dichloropyrimidine with an appropriate amine and cyclization of the product gave only 6-chloro-9-alkyl purines, uncontaminated by the 7-isomer. Nucleophilic displacement of the 6-chloro group with $-NH_2$, $-SH$ and $-OH$ groups produced the desired adenines, mercaptopurines and hypoxanthines respectively in good yields, the 9-substituent being saturated hydrocarbon chain, viz. *n*-undecyl, *n*-dodecyl, *n*-tetradecyl, *n*-hexadecyl and *n*-octadecylpurine. All these compounds are being tested in *in vitro* and *in vivo* screening. As an extension of the alkylation project, alkylation of 5-fluorouracil, a potent anticancer drug used clinically, was also attempted and

some pyrimidine Schiff's bases were also prepared.

PERSONNEL NEWS

Appointments/Promotions

Dr S. Nagabhushana

Dr S. Nagabhushana of the National Aeronautical Laboratory (NAL), Bangalore, has been appointed, on promotion, Scientist E at NAL with effect from 31 December 1976. He is presently heading the Electronics Division of the laboratory. Dr Nagabhushana (born on 1 Jan. 1940) received his degree in electrical engineering from the University of Mysore in 1960 and his Ph. D. from the Indian Institute of Science, Bangalore, in 1976.

Joining NAL in 1960, Dr Nagabhushana participated in the design and development of projects such as the high-speed data system for the 4-ft trisonic wind tunnel, weather information system, dynamic hysteresis graph, and wind electric generator systems.

During 1964-65 Dr Nagabhushana visited Canada for special training in the wind tunnel instrumentation and data systems at the National Research Council. He also visited USA and Canada during 1966 in connection with the training on major sub-systems of the 4-ft tunnel data system. He is an associate member of the Aeronautical Society of India and has 16 research publications to his credit.

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The following personnel of the Central Leather Research Institute, Madras, have been promoted: Shri N. Subramniam (as Scientist E; 14 Oct. 1975); Shri T. J. Devassy (as Scientist E; 23 Dec. 1975); Shri S. N. Gupta (as Scientist C; 10 Nov. 1976); Shri M. Venkateswara Rao (as Scientist B; 10 Nov. 1976); Dr T. Ramaswamy (as Scientist B; 16 Nov. 1976); Shri K. Sarjuna Rao (as Scientist B; 10 Nov. 1976); Dr V. Hanumantha Rao (as Scientist B; 30 Nov. 1976); Dr V. Krishnamurthy (as Scientist B; 30 Nov. 1976); and Shri Abdul Waheed (as Scientist B; 13 July 1975).

Shanti Swarup Bhatnagar Prizes (1976) for Science and Technology

The Council of Scientific & Industrial Research (CSIR) awards each year five or more prizes, each of Rs 10,000, for outstanding research, applied or fundamental, in the following disciplines: (i) Physical sciences; (ii) Chemical sciences; (iii) Biological sciences; (iv) Engineering sciences; (v) Medical sciences; (vi) Mathematical sciences; and (vii) Other sciences. The prizes are given in the memory of Dr Shanti Swarup Bhatnagar, the founder-director of the Council.

Nominations are invited for the Shanti Swarup Bhatnagar prizes for science and technology for the year 1976. Any citizen of India below the age of 45 years as on 31 December 1976 and who has made conspicuously important contributions to fundamental/applied sciences in the particular field of his endeavour by his work done in India during the past five years preceding the year of the prize is eligible for nomination.

Nominations can be made amongst others by vice chancellors of universities/deans of science, engineering including technology and medical faculties, directors of IIT's, deans of

faculties and institutions deemed to be of university status and heads or director generals of major R&D organizations such as DRDO, ICAR, ICMR, Space Communication, BARC, TIFR, and the directors of CSIR laboratories. University faculties and IITs should recommend persons working in their institutions only and route the nominations through their respective vice chancellors or directors. The directors of CSIR laboratories can nominate a candidate in the discipline of their interest, irrespective of whether they are working in CSIR laboratories or outside.

Each such nomination shall be accompanied by detailed statement of work and attainment of the nominee, and a critical assessment report (not more than 500 words) bringing out the importance of the significant research and development contributions of the nominee made during 5 years preceding the year of prize.

The last date for receiving the nominations for the prize is 15 May 1977. Nominations should be sent in sealed cover, marked 'Confidential' to the Head, Extra-Mural Research, Council of Scientific & Industrial Research, Rafi Marg, New Delhi 110001.

FORM IV

(See Rule 8)

Statement about ownership and other particulars as required by clause 19-D of the Press and Registration of Books Act.

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| 6. Names and addresses of individuals who own the newspaper and partners or shareholders holding more than one per cent of the total capital: | |

I, Y. R. Chadha, hereby declare that the particulars given above are true to the best of my knowledge and belief.

15 March 1977

(Sd) Y. R. Chadha
PUBLISHER

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